Ontario

MDS

Minimum Distance Separation (MDS) Formulae

Implementation Guidelines

Publication 707

Ministry of Agriculture, Food and Rural Affairs

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MDS Implementation Guidelines

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Ministry of Agriculture, Food and Rural Affairs

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PREFACE

Separation siting of Ontario livestock barns originated in 1970, with the introduction of the document *A Suggested Code of Practice*. Ontario was experiencing what at the time seemed like a proliferation of new, large livestock and poultry barns. 'Large' at that time was 600 feeder hogs, 60 dairy cows, or 15,000 chicken broilers. These seem small by today's standards. Today, large barns are commonly triple the size of those of the past, accommodating 2,000 feeder hogs, 250 dairy cows, or 50,000 chicken broilers at one time. To address nuisance effects associated with odour, *A Suggested Code of Practice* recommended fixed minimum separation distances between livestock or poultry barns and neighbouring houses, residential zones, lot lines and roads.

A Suggested Code of Practice encouraged farmers to apply for a Certificate of Approval from the government. The Certificate outlined the minimum amount of land required based on the avoidance of risk to ground water pollution by compounds of nitrogen, and the number of animal units on the farm. *A Suggested Code of Practice* rationalized that the effect of objectionable odours in a neighbourhood could be reduced if livestock and poultry facilities were located as far as practically possible from nearby dwellings. It recommended simple, fixed minimum separation distances for both the proposed barn and manure storages.

Revisions were made in a subsequent edition of *A Suggested Code of Practice* in 1973. While it contained a framework for the establishment and expansion of livestock enterprises, it provided little protection from encroachment by other land uses.

In 1976, the *Agricultural Code of Practice* was published which incorporated a number of changes and provided a two-way approach to separating livestock and poultry barns from non-compatible uses and vice-versa. It introduced the concept of a sliding scale for separation distances, since fixed distances were too restrictive, or too lenient, depending on the size and type of farm.

In 1976, the Minimum Distance Separation I (MDS I) formula was established to determine the minimum separation distances between proposed new development and existing livestock facilities and/or permanent manure storages.

The Minimum Distance Separation II (MDS II) formula was developed to determine the minimum separation distances between proposed new, enlarged or remodelled livestock facilities and/or permanent manure storages and other existing or approved development.

Both formulae were updated slightly in 1995 in two documents entitled, *Minimum Distance Separation I (MDS I)* and *Minimum Distance Separation II (MDS II)* but the basic principles of the formulae remained the same.

This document replaces all earlier versions of the MDS Formulae.

A review of this document will be undertaken by OMAFRA every five years to ensure the document reflects current land use planning practices and technological innovation within the livestock industry, and continues to meet the needs of agriculture and rural communities.

NOTE TO THE USER REGARDING CD SOFTWARE – To assist municipalities, farmers, consultants and the general public, as a public service, OMAFRA has developed a software program for distribution and use with the MDS Formulae. The 2006 version distributed by OMAFRA will be considered to be the official version for purposes of calculating MDS. OMAFRA is not responsible for errors due to inaccurate or incorrect data or information; mistakes in calculation; errors arising out of modification of the software, or errors arising out of incorrect inputting of data. All data and calculations should be verified before acting on them.

New urban development meets an existing livestock facility

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BACKGROUND

Rural Ontario continues to evolve and change. Farms are increasing in size and complexity. Fewer people living in rural areas are farmers. In 2001, rural residents accounted for about 17 percent of Ontario's total population of 11.5 million people. Farmers made up only one percent of Ontario's total population, and only six percent of the rural population. Only about 1 in 18 people living in rural Ontario actually farms. The number of farmers continues to decrease.

Agriculture continues to evolve and change. Agriculture in Ontario is diverse with a larger number of different crops and commodities. Agriculture in Ontario contributes jobs and billions of dollars per year to the provincial economy.

Increasingly, farm operators are finding it more and more difficult to expand or establish new livestock operations, especially in parts of the province, where historically there has been a great deal of fragmentation of the agricultural land base, through lot creation. Successful livestock operations are limited in the areas where they can affectively be located on suitable agricultural land and away from potential land use conflicts with neighbouring non-farm development. In recognition of the need to protect agricultural lands for agricultural land uses, the province has adopted land use policies which protect agricultural land and farm operations.

The Provincial Policy Statement, 2005 (PPS), is issued under the *Planning Act* and provides policy direction on land use planning matters of provincial interest. The PPS provides that the primary purpose and use of prime agricultural areas is for agriculture.

Policy 2.3.1 of the statement reads:

> *Prime agricultural areas shall be protected for long-term use for agriculture.*
>
> *Prime agricultural areas are areas where prime agricultural lands predominate. Specialty crop areas shall be given the highest priority for protection, followed by Classes 1, 2 and 3 soils, in this order of priority.*

The PPS sets out policies for prime agricultural areas and rural areas, which ensure that these areas are protected for agricultural uses in the long term. The *Planning Act* requires that municipal council decisions on land use planning matters be consistent with the Provincial Policy Statement. Municipalities are encouraged to adopt policies in

their official plans and zoning by-laws, that are more stringent than the PPS, and that work towards controlling or limiting future development that would not be compatible with agricultural uses and livestock operations. A principle of land use planning is the grouping together of compatible land uses and the separating of incompatible land uses. Unfortunately, in rural areas this principle of separating different and incompatible land uses has not always been applied. As in many urban areas where industry and residences are located side-by-side, conflicts about the way business is carried out sometimes arise between farmers and their rural neighbours. Even with the best management practices, noise and dust cannot be eliminated from certain agricultural operations and odours are often associated with livestock production.

The objective of Minimum Distance Separation (MDS) Formulae is to minimize nuisance complaints due to odour and thereby reduce potential land use conflicts. MDS does not account for other nuisance issues such as noise and dust.

The separation distances calculated by MDS will vary according to a number of variables including type of livestock, size of the farm operation, type of manure system and the form of development present or proposed. History shows, that where there has been sufficient separation distance between differing rural uses, there have been few odour complaints.

MDS applies in both rural areas and in prime agricultural areas of municipalities, as directed in policies 1.1.4.1(c) and 2.3.3.3 of the PPS:

> *New land uses, including the creation of lots, and new or expanding livestock facilities shall comply with the minimum distance separation formulae.*

A separate document available from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), *Guide to Agricultural Land Use*, (Publication 824) contains advice on avoiding or reducing the potential for conflict between neighbouring land uses through appropriate farm practices. It explains the role of agricultural land use planning and advises on conflict avoidance and resolution. For rural non-farm residents, the guide provides an overview of agricultural practices and how to minimize their environmental impacts.

When a neighbour is bothered by what they perceive as abnormal odours, noise or dust, he or she should first try resolving the matter by speaking with the farmer believed to be creating the nuisance. If the complaint is not resolved, neighbours or farmers can seek assistance from a local Municipal Agricultural Advisory Committee, which has been established to deal with nuisance issues, if one exists. If further mediation is still necessary, neighbours or farmers can contact OMAFRA's Agricultural Information Contact Centre at 1-877-424-1300. The Contact Centre will arrange for the appropriate OMAFRA staff person to contact the parties and facilitate a conflict resolution process. For those issues that cannot be resolved through mediation, the Normal Farm Practices Protection Board, established under the *Farming and Food Production Protection Act, 1998*, provides a forum for complaint resolution other than the courts.

While MDS is an important and effective tool for dealing with nuisance issues related to odour, it will not eliminate all potential for odour complaints, nor will it address other nuisance issues such as noise, dust, light, smoke, vibration or flies. The MDS formulae is only intended to deal with odour generated from livestock facilities, such as barns and manure storages, and is not intended to address nuisance issues related to odour from land application of manure. In addition to the MDS formulae, municipalities are encouraged to develop policies in their official plans and zoning by-laws to address Policy 2.3.5.2 and Policy 1.1.3.9 of the PPS, and provide for mitigation of impacts from new or expanding settlement areas and non-agricultural uses on surrounding agricultural operations.

For additional information about resolving nuisance complaints, see the Factsheet, *The Farming and Food Production Protection Act (FFPPA) and Nuisance Complaints*, Order No. 05-013 or the *Citizen's Guide to the Farming and Food Production Protection Act and the Normal Farm Practices Protection Board* are available from OMAFRA's Agricultural Information Contact Centre, 1-877-424-1300 or the ministry's website **www.omafra.gov.on.ca**.

Anaerobic digesters are able to convert manure into methane, then into electricity for use on the farm or for sale to others

DEFINITIONS

Except for references to legislation which are traditionally in italics, italicized terms in this document are defined in the Definitions section below.

Agricultural use – As defined in the Provincial Policy Statement, 2005, this means the growing of crops, including nursery and horticultural crops; raising of livestock; raising of other animals for food, fur or fibre, including poultry and fish; aquaculture; apiaries; agro-forestry; maple syrup production; and associated on-farm buildings and structures, including accommodation for full-time farm labour when the size and nature of the operation requires additional employment.

Agricultural-related uses – As defined in the Provincial Policy Statement, 2005, this means farm-related commercial and farm-related industrial uses that are small scale and directly related to the farm operation and are required in close proximity to the farm operation. Examples of this use include animal husbandry services, produce or grain storage facilities, and seed dealers.

Anaerobic digester – An enclosed vessel in which micro-organisms break down organic materials (e.g. manure and other organic materials), in the absence of oxygen, resulting in the production of biogases, consisting primarily of methane and carbon dioxide. The Minimum Distance Separation Formulae is to be applied to on-farm anaerobic digesters, which utilize manure as an input. An on-farm anaerobic digester may include a *co-substrate input tank* fitted with a tight cover, in which permitted off-farm non-agricultural source materials are temporarily stored before feeding into the anaerobic digester.

Catastrophe – An unanticipated, disastrous loss of part, or all, of a *livestock facility* due to fire, collapse, flood, wind, or other such event.

Commercial use – The use of land, building or structure for the purpose of buying and/or selling commodities and supplying services, such as automotive service stations, car washes, convenience retail shops, hotels or motels, shopping centres and supermarkets.

Co-substrate input tank (CSIT) – Storage for containing permitted non-agricultural wastes that will be blended with manure in an on-farm *anaerobic digester* in order to increase biogas production.

Digestate – End product from the anaerobic digestion of manure (and possibly permitted *co-substrate input tank* materials) that has a significant reduction in pathogens and odour.

Dwelling – Any building that is used or designed for use as a domestic establishment in which one or more persons may sleep and prepare and serve meals.

Empty facility – A *livestock facility* that does not currently contain any manure, house any *livestock*, or contain organic material used for *anaerobic digesters*.

Existing livestock facility – A *livestock facility*, or a portion of a *livestock facility*, intended for keeping or housing of *livestock* and containing one or more barns or structures. Includes *manure or material storages*, whether associated with a *livestock facility* or not, and *anaerobic digesters*, which have already been constructed.

Expanded livestock facility – Any building activity to construct or expand a *livestock facility* that requires a building permit and results in an increase, or decrease, in *Nutrient Unit* capacity on a *lot*, where there already was some existing *Nutrient Unit* capacity.

First livestock facility – Any building activity to construct a *livestock facility* that requires a building permit and results in an increase in *Nutrient Unit* capacity on a *lot*, where there was no existing *Nutrient Unit* capacity.

Housing capacity – Maximum *livestock* capacity for all facilities on a *lot* at any time, even if currently empty but able to house *livestock*.

Industrial use – The use of land, buildings or structures for the purpose of manufacturing, processing, fabricating or assembly of raw materials or goods, warehousing or bulk storage of goods, and related accessory uses.

Institutional use – The use of land, buildings or structures for public or social purposes, including religious, governmental, educational, charitable, health, or other non-*commercial* uses, and may include cemeteries, places of worship, municipal buildings, police and fire stations, schools, hospitals, and seniors complexes.

Livestock – Includes dairy, beef, swine, poultry, horses, goats, sheep, ratites, fur-bearing animals, deer & elk, game animals, birds, and other animals identified in Table 1.

Livestock facility – One or more barns or permanent structures with *livestock-occupied portions*, intended for keeping or housing of *livestock*. A *livestock facility* also includes all *manure* or *material storages* and *anaerobic digesters*.

Livestock occupied portion – Areas of *livestock facilities* where *livestock* spend the majority of their time, allowing substantial amounts of manure to accumulate, but not including feed preparation rooms, milking centres, offices, washrooms, riding arenas, *livestock* loading chutes, or *livestock* assembly areas.

Lot(s) – A parcel or tract of land, within a registered plan or subdivision or described in a deed or other legal document, that is capable of being legally conveyed.

Manure or material storage – Permanent storages, which may or may not be associated with a *livestock facility* containing liquid manure (< 18% dry matter), solid manure (≥ 18% dry matter), or digestate (< 18% dry matter). Permanent storages may come in a variety of:

- locations (under, within, nearby, or remote from barn)
- materials (concrete, earthen, steel, wood)
- coverings (open top, roof, tarp, or other materials)
- configurations and shapes
- elevations (above, below or partially above grade)

Multiple residential – Three or more *residential* units in the same structure.

Nutrient Unit (NU) – An amount of nutrients that give a fertilizer replacement value of the lower of 43 kilograms of nitrogen, or 55 kilograms of phosphate as nutrient (as defined in Ontario Regulation 267/03 made under the *Nutrient Management Act*, 2002).

Recreational use – high intensity – Recreational use that usually includes buildings and/or a higher density or concentration of human activity such as golf courses, sports fields, trailer parks, campgrounds and conservation areas with facilities.

Recreational use – low intensity – Recreational use that usually does not require buildings, does not alter the soil or topography, and/or has a lower density or concentration of human activity such as open space and environmental areas.

Residential use – The use of land, buildings or structures for human habitation.

Rural residential cluster – Four, or more, adjacent rural *lots*, generally one hectare or less in size, sharing a common contiguous boundary. *Lots* located directly across a road from one another shall be considered as having a common boundary.

Settlement areas – As defined in the Provincial Policy Statement, 2005, this means urban areas and rural settlement areas within municipalities (such as cities, towns, villages and hamlets) that are:

a) built up areas where development is concentrated and which have a mix of land uses; and

b) lands which have been designated in an official plan for development over the long term planning horizon provided for in policy 1.1.2. In cases where land in *designated growth areas* is not available, the *settlement area* may be no larger than the area where development is concentrated.

Rural residential clusters are not considered *settlement areas*, unless designated as such in a municipal official plan.

Storage capacity – Maximum storage volume (measured as cubic feet or cubic metres) of all storages for *manure*, or *digestate* treated through an *anaerobic digester*, on a *lot* at any time, even if currently empty but able to store these materials.

Tillable hectares – Land, including pasture that can be worked or cultivated to grow crops.

An overhead view of a concrete liquid manure storage facility

IMPLEMENTATION GUIDELINES – MINIMUM DISTANCE SEPARATION FORMULAE

The following section outlines the specific implementation guidelines that need to be considered as part of the application and calculation of the Minimum Distance Separation (MDS) Formulae. To assist the user the implementation guidelines have been organized into six sections.

Implementation Guideline	MDS I	MDS II

General Rules and Application of the Minimum Distance Separation Formulae

The following implementation guidelines speak to some of the general rules regarding the MDS Formulae, and how they are to be referenced in planning documents and applied to land use applications and building permits. This section also highlights some of the specific instances where MDS Formulae are applied and exceptions where they are not applied.

1. Application of MDS and reference in municipal planning documents	MDS Formulae and criteria are to be referenced in official plans, included in zoning by-laws and applied in designations and zones where *livestock facilities* are a permitted use. MDS will be applied in Prime Agricultural Areas and Rural Areas as defined by the Provincial Policy Statement, 2005.
2. What MDS <u>does</u> and <u>does not</u> apply to	MDS applies to *livestock facilities*. It does not apply to abattoirs, apiaries, assembly yards, fairgrounds, feed storages, field shade shelters, greenhouses, kennels, *livestock facilities* that are less than 10 m^2 (108 ft^2) in floor area, machinery sheds, mushroom farms, pastures, slaughter houses, stockyards, or temporary field nutrient storage sites (as defined under the *Nutrient Management Act, 2002*).
3. MDS and manure transfer facilities	Some *livestock facilities* require small facilities for holding some manure before transfer to long-term permanent storage, or transfer to field spreading areas, or transfer off the farm entirely. Examples include: small tanks inside or just outside the barn for settling out sand from liquid dairy manure; small sumps inside or just outside the barn for collection and/or mixing of liquid manure from several barn areas; or concrete pads at the end of chicken broiler barns where solid manure is pushed outside awaiting pickup by a trucker. These facilities should be considered as part of the barn and have the same MDS setbacks as the barn.

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Implementation Guideline	MDS I	MDS II
4. MDS and earthen *manure storages*	MDS I is applied to earthen storages, despite the fact they are not considered to be a building. Best management practices recommend the MDS formula be followed for earthen *manure storages*, and this is backed up by the Provincial Policy Statement, 2005, *'New land uses, including the creation of lots and new or expanding livestock facilities shall comply with the minimum distance separation formulae'.*	MDS II is triggered when a building permit is required, but because earthen storages are not considered to be a building, they do not require a building permit. However, this does not exclude them from the requirement for siting according to the MDS formula. Best management practices recommend the MDS formula be followed for earthen *manure storages*, and this is backed up by the Provincial Policy Statement, 2005, *'New land uses, including the creation of lots and new or expanding livestock facilities shall comply with the minimum distance separation formulae'.*
5. When are MDS Formulae implemented and applied?	MDS I is applied at the time of planning and/or development review for proposed new development, such as *lot* creation, building permits for development on a *lot* in accordance with Implementation Guideline # 6, rezoning or redesignation of agricultural land to permit development, in proximity to *existing livestock facilities* on an existing or proposed separate parcel of land.	MDS II is applied at the time of building permit application to build a *first* or *expanded livestock facility.*
6. MDS and surrounding development. When is MDS applied?	MDS I is applied to all *livestock facilities* reasonably expected to be impacted by the proposed development, *lot* creation, rezoning or redesignation. For Type A applications, apply MDS I for *livestock facilities* within a 1000 metre radius. For Type B applications apply MDS I for *livestock facilities* within a 2000 metre radius. Separate MDS I calculations should be undertaken for each *livestock facility* located on a separate parcel of land. See Implementation Guidelines # 34 and # 35 for a discussion regarding Type A and Type B land uses.	MDS II is applied to all development reasonably expected to be impacted by the proposed *first* or *expanded livestock facility.*

Implementation Guideline	MDS I	MDS II
7. Application of MDS to development on existing *lots*	Municipalities have the option, but are strongly encouraged to apply MDS I to development proposed through building permit on an existing *lot*. Construction of a *dwelling*, or other structures that are incompatible with *livestock facilities*, on an existing *lot* can have a very detrimental impact on the ability of surrounding agricultural operations to expand in the future, and often introduces a potential new source for nuisance complaints regarding odour from a *livestock facility*, that would generally not be allowed if the *lot* were to be created today. To address the potential negative impact of nuisance complaints to surrounding *livestock* operations from development on existing *lots*, municipalities are encouraged to undertake a thorough review of this issue at the next update of their municipal planning documents. Municipalities should consider approaches to address the future use and suitability of development on existing *lots*. The application of MDS I to development on existing *lots* will take its direction from the applicable municipal planning documents.	MDS II applies to *lot* lines.
8. MDS and Consent Applications	MDS I is applied to a proposed *lot*, vacant or with existing structures. Where a new *lot* is proposed with an existing *dwelling*, and that *dwelling* is already located on a *lot* separate from the subject *livestock facility*, MDS I is not applied as the potential odour conflict is already present between the neighbouring *livestock facility* and the existing *dwelling*. However, municipalities may choose to apply MDS I from the neighbouring *livestock facility* to a proposed *lot* with an existing *dwelling*. Direction to apply MDS I in these circumstances should be clearly indicated in the municipality's planning documents. MDS I is applied to a proposed *lot* with an existing *dwelling* when the *dwelling* is presently located on the same *lot* as the subject *livestock facility*.	N/A

Implementation Guideline	MDS I	MDS II
9. MDS and Zoning By-Law Amendments	MDS I is applied when new development is proposed by way of a re-zoning in a zone where agriculture is a permitted use.	N/A
10. MDS and Official Plan Amendments	MDS I is applied to lands being considered for non-agricultural designation through the official plan amendment process.	N/A
11. Application of MDS after a *catastrophe*	Where municipalities apply MDS I to buildings or structures on an existing *lot*, municipalities have the option to not apply MDS I after a *catastrophe* that destroys part or all of a *dwelling*, providing the resulting new *dwelling* is built no closer to a *livestock facility* than before the *catastrophe*.	Municipalities have the option to not apply MDS II after a *catastrophe* that destroys part or all of a *livestock facility*, providing the resulting *livestock facility* is built no closer to a surrounding development than before the *catastrophe*. However, if rebuilding results in higher values for Factor A, B and/or D than before the *catastrophe*, then MDS II applies.
12. Existing uses that do not conform to MDS	MDS I is applied to new proposed development, even though there may be existing non-*agricultural uses* that do not conform to MDS I requirements. Where there are four, or more, existing non-farm uses closer to the subject *livestock facility* and in immediate proximity to the current application, MDS I will not be applied. The current application must not be located closer to the *livestock facility* than the four, or more, existing non-farm uses.	MDS II is measured from the proposed new construction of an *expanding livestock facility(ies)* even though there may be parts of the existing *livestock facility*, that do not conform.
13. Non-application of MDS to accessory structures	When a municipality applies MDS I to development on an existing *lot*, it is not applied to buildings and structures, accessory to a *dwelling*, such as decks, garages, gazebos, greenhouses, outbuildings, picnic areas, patios or sheds.	MDS II is not applied to buildings and structures, accessory to a *dwelling* on an adjacent *lot*, such as decks, garages, gazebos, greenhouses, outbuildings, picnic areas, patios or sheds.

Implementation Guideline	MDS I	MDS II
14. *Livestock occupied portions of livestock facilities*	MDS is not applied to portions of the *livestock facility* where *livestock* are not normally present for a long enough time for substantial amounts of manure to accumulate. For example, this includes feed bins, feed preparation areas, field shadeshelters, *livestock* assembly areas, *livestock* loading chutes, machinery sheds, milking centres, offices, riding arenas, silos or washrooms.	
15. Setbacks - *dwelling* from *livestock facilities*, same *lot*	Neither MDS I nor MDS II are applied between a *dwelling* and a *livestock facility* located on the same *lot*.	
16. Ownership of adjacent land by same owner	MDS is applied regardless of the ownership of adjacent or adjoining legally separate *lots*. Ownership of adjacent or adjoining legally separate *lots* by the same owner does not prevent the application of MDS.	

Determining *Livestock Facility* Capacity

The following implementation guidelines provide direction on determining the capacity of a *livestock facility* for calculating MDS; as well as, direction on applying MDS to *empty livestock facilities*.

17. Obtaining Required *Livestock* Information from Owners	Information to be used in MDS calculations, (such as capacity of the *livestock facility*, type of *manure storage*, number of *tillable hectares*, etc.,) should be obtained from the owner of an *existing* or *first livestock facility*. It may be necessary to independently verify the information received from the owner of the *livestock facility* to ensure accuracy of an MDS calculation.	
18. Smallest size of *livestock facility* for MDS	For the purposes of calculations, the smallest size of *livestock facility* is deemed to be five *Nutrient Units*, regardless if there are fewer *Nutrient Units* within the *livestock facility*, or not.	
19. Capacity of *livestock facilities* for MDS	MDS calculations shall be based on the maximum *livestock housing capacity* for all *livestock facilities* on a *lot*, even if the building is not currently used, but is structurally sound and reasonably capable of housing *livestock*. This also applies for permanent *manure storages* on *lots* where there is no *livestock* generating manure.	
20. Application of MDS to *empty livestock facilities*	MDS I applies to *empty livestock facilities* if they are structurally sound and reasonably capable of housing *livestock*, or storing manure. The MDS I calculation should be based on the most probable Factors A, B and D. The Ministry of Agriculture, Food and Rural Affairs may provide municipalities with additional information to guide them in this determination. See Implementation Guidelines # 25, 26 and 28 regarding Factors A, B and D.	MDS II applies to *empty livestock facilities* that are part of an *expanding livestock facility* if they are structurally sound and reasonably capable of housing *livestock*, or storing manure. The MDS II calculation should be based on the most probable Factors A, B and D.

continued...

Implementation Guideline	MDS I	MDS II
20. Application of MDS to *empty livestock facilities* continued...		continued... See Implementation Guidelines # 25, 26 and 28 regarding Factors A, B and D. However, *empty livestock facilities* can be excluded from MDS II calculations for *expanding livestock facilities* if a building permit is required for altering the facilities so they are no longer capable for the housing of *livestock* (or manure). Municipalities may consider other approaches which achieve the same objective.

Anaerobic Digesters

The following implementation guidelines speak to issues related specifically to *anaerobic digesters*, such as determination of appropriate MDS factors, and setbacks for *co-substrate input tanks (CSIT)* and *anaerobic digesters (AD)*.

21. Storages for *digestate* from an *anaerobic digester* and how to apply Factors B and C	When a *livestock facility* installs an *anaerobic digester* (*AD*), some supplemental agricultural or non-agricultural materials may be imported to help boost biogas production. This means a larger storage for the resulting materials treated by the *AD* system is required. If an adjacent *livestock facility* has an *AD* system and there are imported supplemental materials, then for Factor B, use the greater of the NU capacity for *livestock* on the *lot*, versus the NU capacity of all storage volumes using 19.8 m^3/NU (700 ft^3/NU) from Table 1. For example, a 100 NU swine farm has an *AD* system and imports supplemental materials to boost biogas production. There is just one storage of 2,376 m^3 capacity. For Factor B, this is 2,376 m^3 ÷ 19.8 m^3/NU = 120 NU, which is greater than 100 NU for swine. Use 120 NU in Table 2 to determine Factor B.	When a *livestock facility* installs an *anaerobic digester* (*AD*), some supplemental agricultural or non-agricultural materials may be imported to help boost biogas production. This necessitates the need for larger storage for the resulting *digestate* from the *AD* system. In MDS II, for Factor B, use the greater of the NU capacity for *livestock* on the *lot*, versus the NU capacity of the proposed storage volume using 19.8 m^3/NU (700 ft^3/NU) from Table 1. For Factor C, use the increased NU capacity of the proposed storage volume compared to the NU capacity for the *livestock* on the *lot*. continued...

Implementation Guideline	MDS I	MDS II
21. Storages for *digestate* from an *anaerobic digester* and how to apply Factors B and C continued...		continued... For example, a 100 NU swine farm proposes to build 2,376 m^3 of storage for manure and other imported materials treated by an *AD* system. For Factor B, this is 2,376 m^3 ÷ 19.8 m^3/NU = 120 NU, which is greater than 100 NU for swine. Use 120 NU in Table 2 to determine Factor B. For Factor C, the NU capacity of the proposed storage is 120 NU compared to 100 NU for swine. The increase is 120 NU–100 NU = 20 NU, or 20 NU/100 NU x 100 = 20%. Use 20% in Table 3 to determine Factor C.
22. *Anaerobic digesters* and *co-substrate input tanks*	*Co-substrate input tanks (CSIT)* may be installed to store imported agricultural or non-agricultural materials prior to input into an *anaerobic digester (AD)*. The required MDS I separation from a *CSIT* and/or *AD* is 125 m regardless of size or type, and whether greater or lesser MDS I setbacks are calculated based on the *livestock* NU capacity or potential NU capacity based on *tillable hectares*.	*Co-substrate input tanks (CSIT)* may be installed to store imported agricultural or non-agricultural materials prior to input into an *anaerobic digester (AD)*. The required MDS II separation from a *CSIT* and/or *AD*, regardless of size or type, is: • 125 m for Type A land uses • 250 m for Type B land uses • 125 m to the nearest neighbour's house • 13 m to the nearest *lot* line • 25 m to the nearest road allowance

Implementation Guideline	MDS I	MDS II

MDS Formulae and Factors

The following implementation guidelines provide direction on the calculation of the MDS Formulae for MDS I and MDS II. In addition, they provide a brief summary of the Factors used to calculate MDS, and specific considerations related to the calculation.

23. Calculating building base distance, 'F'	F = Factor A x B x D x E (Note: Factor C not used in MDS I)	F = Factor A x B x C x D (Note: Factor E not used in MDS II)
24. Calculating permanent *manure storage* base distance, 'S'	'S' is not calculated, but read directly from Table 6 by first calculating the building base distance 'F', then choosing the new added 'Permanent Manure Storage Type' from Table 5.	
25. Storage base distances ('S') when F>1000 metres	If 'F' > 1000 m, the Storage Base Distance 'S' is the same as the Building Base Distance, 'F' as noted in Table 6.	
26. Factor A - Odour Potential Factor	Factor A is based on the type of *livestock* and its relative potential for emanating offensive odours. The higher the Factor A, the higher the odour potential, and the higher the resulting MDS separation distances, all other things being equal. See Table 1.	
27. Factor B - *Nutrient Units* Factor	Factor B is based on the number, or equivalent number, of *Nutrient Units (NU)* in *housing capacity* at a *livestock facility*. The higher the number of NU, the higher the Factor B, and the higher the resulting MDS separation distances, all other things being equal. See Table 2. In determining Factor B, it may be required to interpolate a value from Table 2. Interpolated values for Factor B should not include more than two decimal places, and may need to be rounded accordingly.	
28. Factor C - Orderly Expansion Factor	Does not apply for MDS I	Factor C only applies for MDS II, and is based on the percentage increase in the number of NU for the proposed construction. The higher the percentage increase, the higher the Factor C, and the higher the resulting MDS II, all things being equal. Expansion of a *livestock facility* is a necessary and typical process for the economic development of most farm operations, and can reasonably be expected over time.

continued...

Implementation Guideline	MDS I	MDS II
28. Factor C - Orderly Expansion Factor continued...		continued... Factor C allows for future expansion. Factor C is the highest it can be for the *first livestock* building (or first permanent *manure storage* where no *livestock* are housed) on a *lot*, resulting in a building location that will allow most subsequent *livestock* buildings to be built within a reasonable building envelope. Factor C is smallest for no increase in NU (0% increase), or decreases in NU ('negative' increase), rare on most farms, except when replacing an old building with little to no additional *livestock* capacity, downsizing, or when installing storages to increase manure holding capacity to prevent spreading at inappropriate times of the year. For the purposes of determining Factor C, all *first livestock facilities* are to be calculated at Factor C = 1.14. Where an *existing livestock facility* is to be expanded, the percentage increase shall be calculated using: the total additional *Nutrient Units* proposed as the numerator, and the total existing *Nutrient Units* as the denominator. For example, an *existing livestock facility* currently has 200 *nutrient units* and proposes to add 100 additional *Nutrient Units*. In this case percentage increase, would be calculated as 100 NU divided by 200 NU and then multiplied by 100 for a value of 50 % (100/200) x 100 = 50 % continued...

Implementation Guideline	MDS I	MDS II
28. Factor C - Orderly Expansion Factor continued...		continued... Where a *livestock facility* is to be expanded, and one or more building permits to establish or expand that *livestock facility* were already issued within the previous three years, the percentage increase shall be calculated using: the total additional *Nutrient Units* established or added by building permit issued during the previous three year period, plus the proposed expansion, as the numerator; and the total existing *Nutrient Units* prior to the previous three year period as the denominator. For example, an *existing livestock facility* currently has 200 *Nutrient Units* and proposes to add 100 additional *Nutrient Units*. A building permit for this *livestock facility* was issued 2 years ago, and increased the size of the operation at that time from 100 *Nutrient Units* to 200 *Nutrient Units*. In this case, percentage increase would be calculated as 200 NU (100 NU for this expansion plus 100 NU for expansion 2 years ago) divided by 100 NU (the total capacity of the *livestock facility* 3 years ago) and then multiplied by 100 for a value of 200%. [(100+100)/100] x 100 = 200 % See Table 3 for further information. In determining Factor C, it may be required to interpolate a value from Table 3. Interpolated values for Factor C should not include more than four decimal places, and may need to be rounded accordingly.

Implementation Guideline	MDS I	MDS II
29. Factor D - Manure or Material Form in Permanent Storage Factor	Factor D is based on the type of manure or material and its relative potential for emanating offensive odours. The higher the Factor D, the higher the odour potential, and the higher the resulting MDS separation distance, all other things being equal. See Table 1.	
30. Factor E - Encroaching Land Use Factor	Factor E is based on the degree of effect an encroaching land use might have on an *existing livestock facility*. The higher the encroachment factor, the higher the potential effect on a *livestock facility*, and the higher the resulting MDS I separation distance, all other things being equal. See Table 4.	N/A
31. Calculating weighted averages for Factor A	In MDS I, Factor A may require a weighted average, if there are more than one type of *livestock* housed with differing values for Factor A. For example, if an adjacent *livestock facility* houses 50 NU of chicken broilers with Factor A = 0.7, and 100 NU of swine feeders with Factor A = 1.2, then the weighted average Factor A is: [(50 x 0.7)+(100 x 1.2)]÷(50+100) = 1.03 When calculating a weighted average, the value of Factor A should not include more than two decimal places, and may need to be rounded accordingly.	In MDS II, Factor A may require a weighted average, if more than one type of *livestock* is added with differing values for Factor A. For example, if a farmer proposes to add 50 NU of chicken broilers with Factor A = 0.7, and 100 NU of swine feeders with Factor A = 1.2, to a *livestock facility*, then the weighted average Factor A is: [(50 x 0.7)+(100 x 1.2)]÷(50+100) = 1.03 When calculating a weighted average, the value of Factor A should not include more than two decimal places, and may need to be rounded accordingly.
32. Calculating weighted averages for Factor D	In MDS I, Factor D may require a weighted average, if there are more than one type of *livestock* housed with differing values for Factor D. For example, if an adjacent *livestock facility* houses 50 NU of chicken broilers with Factor D = 0.7, and 100 NU of swine feeders with Factor D = 0.8, then the weighted average Factor D is: [(50 x 0.7)+(100 x 0.8)]÷(50+100) = 0.77 continued...	In MDS II, Factor D may require a weighted average, if more than one type of *livestock* is added with differing values for Factor D. For example, if a farmer proposes to add 50 NU of chicken broilers with Factor D = 0.7, and 100 NU of swine feeders with Factor D = 0.8, then the weighted average Factor D is: continued...

Implementation Guideline	MDS I	MDS II
32. Calculating weighted averages for Factor D continued...	continued... When calculating a weighted average, the value of Factor D should not include more than two decimal places, and may need to be rounded accordingly.	continued... [(50 x 0.7)+(100 x 0.8)]÷(50+100) = 0.77 When calculating a weighted average, the value of Factor D should not include more than two decimal places, and may need to be rounded accordingly.
33. *Tillable hectares*	In MDS I, Factor B is based on the greater of the existing *Nutrient Unit housing capacity* of the *livestock facility*, or the potential *Nutrient Unit housing capacity* of the *livestock facility* based on the product of *tillable hectares* on that *lot* multiplied by 7.5 *Nutrient Units/tillable hectare* (to a maximum of 300 *Nutrient Units*). However, for *settlement area* expansions only, MDS I is based on the existing *Nutrient Unit housing capacity* and not *tillable hectares*. See the following examples: For example: 20 NU operation on 10 hectares; *housing capacity* is 75 NU 20 NU operation on 45 hectares: *housing capacity* is 300 NU 300 NU operation on 10 hectares; *housing capacity* is 300 NU 300 NU operation on 45 hectares: *housing capacity* is 300 NU.	N/A
34. Rounding of MDS calculations	All resulting calculated separation distances are rounded up to the nearest metre.	

Implementation Guideline	MDS I	MDS II
Type A and B Land Uses These implementation guidelines outline considerations regarding the interpretation of Type A and Type B land uses for MDS I and II, and how different land uses should be treated in MDS. They also provide specific direction on exceptions to Type A and Type B land uses.		
35. Type A land uses	Type A land uses are typically characterized by uses that have a lower density of human occupancy, habitation or activity. For the purposes of MDS I, Type A land uses include applications to rezone or redesignate agricultural lands for *industrial, agricultural-related or recreational use – low intensity* purposes. Type A land uses include applications to permit: • construction of a *dwelling* on an existing *lot* where the municipality has determined that MDS I should be applied, or the • creation of up to three *lots* either by consent or plan of subdivision	Type A land uses are typically characterized by uses that have a lower density of human occupancy, habitation or activity. For the purposes of MDS II, Type A land uses include areas zoned or designated *industrial, agricultural-related or recreational use – low intensity.* Type A land uses include *residential dwellings* on *lots* zoned agriculture, rural *residential, residential*, or other similar zoning. This includes existing *residential* uses on separate *lots* not recognized through Official Plan designation as a *residential* area.
36. Type B land uses	Type B land uses are typically characterized by uses that have a higher density of human occupancy, habitation or activity. For the purposes of MDS I, Type B land uses include applications to rezone or redesignate agricultural lands for *residential, institutional, recreational use – high intensity, commercial or settlement area* purposes. Type B land uses include applications to permit: • creation of *residential* subdivisions in rural areas, or • expansion of a *settlement area*, or • creation of *multiple residential* development, or • the creation of a *lot* which results in a *rural residential cluster*	Type B land uses are typically characterized by uses that have a higher density of human occupancy, habitation or activity. For the purposes of MDS II, Type B land uses include areas zoned or designated *settlement area, recreational use – high intensity, institutional, or commercial.* Type B land uses include areas designated in an Official Plan as *residential* for: • *residential* subdivisions, or • multiple *residential*, or • estate *residential* development

Implementation Guideline	MDS I	MDS II
37. Application to *settlement areas*	MDS I does not apply to proposed non-*agricultural uses* in approved *settlement area* designations. However, municipalities have the option to apply MDS I from *livestock facilities* within a *settlement area* designation. The application of MDS I will take its direction from the applicable municipal planning documents.	Where municipalities permit *first* or *expanded livestock facilities* within approved *settlement area* designations, municipalities have the option, but are strongly encouraged to apply MDS II. The application of MDS II will take its direction from the applicable municipal planning documents.
38. Cemeteries	For the purposes of MDS I, cemeteries should be considered a Type B land use, as they are an *institutional use*.	For the purposes of MDS II, cemeteries should be considered a Type B land use, as they are an *institutional use*. However, cemeteries may be treated as a Type A land use when the cemetery is closed and receives low levels of visitation. Cemeteries such as this should be clearly identified in the municipality's planning documents.
39. *Rural residential clusters*	For the purposes of MDS I, *lot* creation which results in a *rural residential cluster* should be considered a Type B land use.	For the purposes of MDS II, *rural residential clusters* should be considered a Type A land use, except where they have been identified and designated in an Official Plan.
40. Rear *lot* lines, side *lot* lines, and road allowances	N/A	In addition to Type A and Type B land uses, MDS II setbacks are calculated from rear *lot* lines, side *lot* lines, and road allowances. Rear and side *lot* line MDS II setbacks are calculated as 0.1 x the Building Base Distance 'F' and Storage Base Distance 'S'. continued...

Implementation Guideline	MDS I	MDS II
40. Rear *lot* lines, side *lot lines*, and road allowances continued...		continued... For example, an MDS II calculation yields values of 100 metres for Building Base Distance 'F' and 123 metres for Storage Base Distance 'S'. The required setback for the *livestock facility* from the *lot* lines would be 10 metres (100 x 0.1). The required setback for the *manure storage* from the *lot* lines would be 12.3 metres (123 x 0.1). This value should be rounded to the nearest whole number, so in this instance, the setback for the *manure storage* would be 12 metres. Under no circumstances should the MDS II setback from a rear or side *lot* line exceed 30 metres, see Implementation Guideline #44. Road allowance MDS II setbacks are calculated as 0.2 x the Building Base Distance 'F' and Storage Base Distance 'S'. For example, an MDS II calculation yields values of 100 metres for Building Base Distance 'F' and 123 metres for Storage Base Distance 'S'. The required setback for the *livestock facility* from the road allowance would be 20 metres (100 x 0.2). The required setback for the *manure storage* from the road allowance would be 24.6 metres (123 x 0.2). This value should be rounded to the nearest whole number, so in this instance, the setback for the *manure storage* would be 25 metres.

Implementation Guideline	MDS I	MDS II
Applying MDS - Measurement of MDS Setbacks		
The following implementation guidelines provide direction on measurement of MDS setbacks between *livestock facilities*, and other existing or proposed development, *lot* lines, and road allowances.		
41. Measurement of MDS	For MDS I, measurements are taken as the shortest distance between the area to be rezoned or redesignated and the *livestock occupied portion* of the *livestock facility* (or storage).	For MDS II, measurements are taken as the shortest distance between the point of new construction for the *livestock occupied portion* of a *first* or *expanded livestock facility* and the *dwelling/lot* line/road allowance/or area zoned or designated.
42. Measurement of MDS for *Lot* Creation	For MDS I, measurements are taken as the shortest distance between the *lot* line of the *lot* being created and the *livestock occupied portion* of the *livestock facility* (or storage). Where larger lots may be permitted (generally greater than 1 ha), a suitable location must be identified for a 1 ha building envelope outside the MDS I setback.	N/A
43. Measurement of MDS for development on existing *lots*	Where a municipality chooses to apply MDS I to development proposed through building permit on an existing *lot*, measurements are taken as the shortest distance between the *dwelling* or other structure to be constructed and the *livestock occupied portion* of the *livestock facility*.	N/A
44. Maximum setbacks to side or rear *lot* lines	N/A	The maximum required setback from any *livestock facility* to side or rear *lot* lines is 30 m.

Implementation Guideline	MDS I	MDS II
Applying MDS - Minor Variances		
This section of the MDS Formulae implementation guidelines speak to specific issues regarding minor variances applications under the *Planning Act*.		
45. Affects of wind, etc. on MDS	The direction of prevailing wind, surrounding topography, and presence of trees, berms, or other screening do not affect MDS calculations, but could be elements considered in Minor Variance applications.	
46. Reducing MDS setbacks and minor variances	MDS I setbacks should not be reduced except in accordance with these implementation guidelines. Where a municipality applies MDS I to development on existing *lots*, minor variances to MDS I distances can be considered based on site specific circumstances. Circumstances that meet the intent, if not the precise distances of MDS I, or mitigate environmental impacts, may warrant further consideration.	Minor variances to MDS II distances can be considered based on site specific circumstances. Circumstances that meet the intent, if not the precise distances of MDS II, or mitigate environmental impacts, may warrant further consideration.

MDS I CALCULATION FORM

The following outlines the 10 Steps on how to calculate setbacks to all adjacent *livestock facilities*, reasonably expected to be impacted by an applicant's proposed development. Each step is colour-coded. The applicable topics found in the Implementation Guidelines Chart on pages 9 to 25 and the applicable Tables are noted in the steps below.

Step 1	Location and contact information	Fill in the pertinent information about the applicant, and each adjacent *livestock facility* within 1000 m or more, of the proposed development. Each *livestock facility* must be on its own separate *lot* and should be treated as separate calculations. All barns and structures located on one *lot* should be treated as part of the same *livestock facility*. Implementation Guidelines #1 through #16 provide direction on the general rules and application of the Minimum Distance Separation Formulae.
Step 2	*Livestock facility* animal/material types	For the first *livestock facility* identified in Step 1, fill in all of its existing animal/material types, descriptions, the total maximum *housing capacity*, the number of animals/material per *Nutrient Unit* (NU) and associated manure forms. Information on the existing animal/material types, descriptions, the total number of animals/material, and associated manure forms should be obtained from the owner of the *livestock facility*. It may be necessary to verify this information independently. Information on the number of animals/material per *Nutrient Unit* (NU) can be determined from Table 1. Implementation Guidelines #17 through #20 provide guidance on determining *livestock facility* capacity. Implementation Guidelines #21 and #22 provide direction on dealing with *anaerobic digesters*.
Step 3	Existing *Nutrient Units* (NU)	Calculate the existing total maximum NU capacity of the *livestock facility* by dividing existing capacity of each animal/material type by the number of animals/material per NU as found in Table 1. Then, add all the existing NU together for all the types of animal/material present, to obtain the total maximum number of NU.

MDS I CALCULATION FORM

The following outlines the 10 Steps on how to calculate setbacks to all adjacent *livestock facilities*, reasonably expected to be impacted by an applicant's proposed development. Each step is colour-coded. The applicable topics found in the Implementation Guidelines Chart on pages 9 to 25 and the applicable Tables are noted in the steps below.

Step 1	Location and contact information	Fill in the pertinent information about the applicant, and each adjacent *livestock facility* within 1000 m or more, of the proposed development. Each *livestock facility* must be on its own separate *lot* and should be treated as separate calculations. All barns and structures located on one *lot* should be treated as part of the same *livestock facility*. Implementation Guidelines #1 through #16 provide direction on the general rules and application of the Minimum Distance Separation Formulae.
Step 2	*Livestock facility* animal/material types	For the first *livestock facility* identified in Step 1, fill in all of its existing animal/material types, descriptions, the total maximum *housing capacity*, the number of animals/material per *Nutrient Unit* (NU) and associated manure forms. Information on the existing animal/material types, descriptions, the total number of animals/material, and associated manure forms should be obtained from the owner of the *livestock facility*. It may be necessary to verify this information independently. Information on the number of animals/material per *Nutrient Unit* (NU) can be determined from Table 1. Implementation Guidelines #17 through #20 provide guidance on determining *livestock facility* capacity. Implementation Guidelines #21 and #22 provide direction on dealing with *anaerobic digesters*.
Step 3	Existing *Nutrient Units* (NU)	Calculate the existing total maximum NU capacity of the *livestock facility* by dividing existing capacity of each animal/material type by the number of animals/material per NU as found in Table 1. Then, add all the existing NU together for all the types of animal/material present, to obtain the total maximum number of NU.

Step 4	Weighted Factor A	Determine Factor A (Odour Potential Factor) for each animal/material type present, from Table 1, and fill in the calculation form. If necessary, calculate the weighted average for Factor A, if Factor A is not the same for all animals/materials listed. See Implementation Guidelines #26 and #31 for further direction.
Step 5	Weighted Factor D	Determine Factor D (Manure Form in Permanent Storage Factor) from Table 1, for each animal/material type present, and fill in the calculation form. If necessary, calculate the weighted average Factor D, if Factor D is not the same for all animals/materials listed. See Implementation Guidelines #29 and #32 for further direction.
Step 6	*Tillable hectares* and potential NU	Fill in the maximum *tillable hectares* of land on the *lot* where the *livestock facility* is located, based on information obtained from the owner of the *livestock facility*. It may be necessary to verify this information independently. Calculate the potential total number of NU, which equals: # of *tillable hectares* x 7.5, up to a maximum of 300 NU. Implementation Guidelines #33 and #17 provide more specific information.
Step 7	Factor B and existing vs. potential NU	Compare the total number of existing NU calculated in Step 3 with the total number of potential NU calculated in Step 6. Using the greater of these two numbers, determine Factor B from Table 2, and fill in the correct space on the calculation form. In some circumstances, it will be necessary to interpolate Factor B from Table 2, when the number of NU is not specifically identified in the table. Implementation Guideline #27 provides more specific direction on Factor B.
Step 8	Determine Factor E	Determine and fill in Factor E (Encroachment Land Use Factor) on the calculation form. Factor E can be determined from Table 4. Implementation Guidelines #30 and #35 through #39 provide specific direction on Factor E and the determination of Type A and Type B land uses.
Step 9	F, Building Base Distance	Calculate F (Building Base Distance) = (Factor A) x (Factor D) x (Factor B) x (Factor E), which is the required MDS I setback from the proposed development to the nearest barn of the *livestock facility*. For further information, see Implementation Guidelines #23 and #34.

Step 10	S, *Manure Storage* Base Distance	Establish S (*Manure Storage* Base Distance) by first using Table 5 to choose the existing storage at the *livestock facility* with the highest odour potential: Very Low, Low, Medium, and High. Then, enter Table 6 under the appropriate column and read across using 'F' calculated from Step 9. It may be necessary to interpolate. S, is the required MDS I setback from the proposed development to the nearest *manure storage* at the *livestock facility*. Implementation Guidelines #24 and #25 provide further information. Implementation Guidelines #21 and #22 provide further information on dealing with *anaerobic digesters*. Steps 2 through 10 should be completed for any other *livestock facilities* present, in accordance with Implementation Guideline #6.
Now What?	Using calculated MDS	The calculated values of MDS can now be used in the context of the land use planning application for which they have been prepared. Implementation Guidelines #35 through #40 provide direction around issues regarding Type A and Type B land uses. Implementation Guidelines #41 through #44 provide direction around issues of measurement of MDS setbacks, and, Implementation Guidelines #45 and #46 provide direction on issues regarding minor variances.

Example:

Ms. Smith proposes to create a new *lot*, on agricultural land, adjacent to Mr. Jones' *Swiney-Acres Farm*. This *livestock facility* has:

a) 1200 head swine feeder barn over a slatted floor where all the swine manure is stored,
b) 33000 bird chicken broiler barn (9-week cycle) with solid manure stored outside, uncovered, dry enough for a flowpath option; and,
c) permanent concrete storage for imported solid dairy manure 10 metres wide x 12 metres long and 2 metre walls, with flowpath option.

The *lot* where all Mr. Jones' barns and *manure storage* are has 60 *tillable hectares*. There are no other *livestock facilities* within 1000 m of the proposed *lot*. How far must Ms. Smith's proposed *lot* be from Mr. Jones' nearest barn and nearest *manure storage*?

Evaluator: _____ _____

Date: _____

File Number: _____

Contact Information:

	Applicant Information	**Owner of Adjacent *Livestock Facility* #1**	**Owner of Adjacent *Livestock Facility* #2, etc.**
File Name	Jane	Jim	(No other adjacent *livestock facilities*)
Last Name	Smith	Jones	
Farm/Company	N/A	Swiney-Acres Farm	
Address	123 New Road	124 New Road	
City/Town	Somewhere	Somewhere	
Province	Ontario	Ontario	
Postal Code	N0G 0J0	N0G 0J0	
Upper Tier	Upper Somewhere	Upper Somewhere	
Lower Tier	Lower Somewhere	Lower Somewhere	
Lot	1	2	
Concession	2	2	
911 Number	12345	12346	
Roll Number	666	667	
Telephone	905-555-1111	905-555-3333	
Fax	905-555-2222	905-555-4444	
Email	jsmith@newroad.ca	jjones@newroad.ca	

MDS I Calculation Form:

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Existing NU	Factor A	Factor D
Swine	Feeders (27 kg - 105 kg)	6	Liquid	1200	200	1.2	0.8
Chickens	Broilers (9 week cycle)	300	Solid	33000	110	0.7	0.7
Imported Manure	Max Capacity (10m x 12m x 2m)	19.8	Solid	240	12	1.2	0.7
Total Number of NU					322		
Factor A (Odour Potential Factor)...a weighted average may be necessary						1.03	
Factor D (Manure Form Factor)...a weighted average may be necessary							0.76
Factor B (*Nutrient Units* Factor)							475
Factor E (Encroaching Land Use Factor)							1.1
Maximum tillable hectares on the lot with the livestock facilities		60	X		7.5	=	300 NU (Maximum 300 NU)
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor E							409
S (Manure Storage Base Distance, m)							409

Now What? Repeat MDS calculation process as appropriate for other *livestock facilities* in the vicinity. Apply calculated MDS in the context of the land use planning application for which they were prepared.

Example:

Ms. Smith proposes to create a new *lot* on agricultural land, adjacent to Mr. Jones' *Swiney-Acres Farm*. This *livestock facility* has:

a) 1200 head swine feeder barn over a slatted floor where all the swine manure is stored;
b) 35000 bird chicken broiler barn (9-week cycle) with solid manure stored outside, uncovered, dry enough for a flowpath option; and,
c) permanent concrete storage for imported solid dairy manure 10 metres wide x 12 metres long and 2 metre walls, with flowpath option.

The *lot* where all Mr. Jones' barns and *manure storage* are has 60 *tillable hectares*. There are no other *livestock facilities* within 1000 m of the proposed *lot*. How far must Ms. Smith's proposed *lot* be from Mr. Jones' nearest barn and nearest *manure storage*?

Evaluator: _____

Date: _____

File Number: _____

Contact Information:

	Applicant Information	**Owner of Adjacent *Livestock Facility* #1**	**Owner of Adjacent *Livestock Facility* #2, etc.**
File Name	Jane	Jim	[No other adjacent *livestock facilities*]
Last Name	Smith	Jones	
Farm/Company	N/A	Swiney-Acres Farm	
Address	123 New Road	124 New Road	
City/Town	Somewhere	Somewhere	
Province	Ontario	Ontario	
Postal Code	N0G 0J0	N0G 0J0	
Upper Tier	Upper Somewhere	Upper Somewhere	
Lower Tier	Lower Somewhere	Lower Somewhere	
Lot	1	2	
Concession	2	2	
911 Number	12345	12346	
Roll Number	666	667	
Telephone	905-555-1111	905-555-3333	
Fax	905-555-2222	905-555-4444	
Email	jsmith@newroad.ca	jjones@newroad.ca	

MDS I Calculation Form:

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Existing NU	Factor A	Factor D
Swine	Feeders (27 kg - 105 kg)	6	Liquid	1200	200	1.2	0.8
Chickens	Broilers (9 week cycle)	300	Solid	33000	110	0.7	0.7
Imported Manure	Max Capacity (10m x 12m x 2m)	19.8	Solid	240	12	1.2	0.7
Total Number of NU					322		
Factor A (Odour Potential Factor)...a weighted average may be necessary						1.03	
Factor D (Manure Form Factor)...a weighted average may be necessary							0.76
Factor B (*Nutrient Units* Factor)							475
Factor E (Encroaching Land Use Factor)							1.1
Maximum tillable hectares on the lot with the livestock facilities		60	X		7.5	=	300 NU (Maximum 300 NU)
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor E							409
S (Manure Storage Base Distance, m)							409

Now What? Repeat MDS calculation process as appropriate for other *livestock facilities* in the vicinity. Apply calculated MDS in the context of the land use planning application for which they were prepared.

MDS I CALCULATION BLANK FORM

Evaluator: _____

Date: _____

File Number: _____

Contact Information:

	Applicant Information	Owner of Adjacent *Livestock Facility* #1	Owner of Adjacent *Livestock Facility* #2, etc
File Name			
Last Name			
Farm/Company			
Address			
City/Town			
Province			
Postal Code			
Upper Tier			
Lower Tier			
Lot			
Concession			
911 Number			
Roll Number			
Telephone			
Fax			
Email			

MDS I CALCULATION BLANK FORM

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Existing NU	Factor A	Factor D
Swine							
Chickens							
Imported Manure							
Total Number of NU							
Factor A (Odour Potential Factor)...a weighted average may be necessary							
Factor D (Manure Form Factor)...a weighted average may be necessary							
Factor B (*Nutrient Units* Factor)							
Factor E (Encroaching Land Use Factor)							
Maximum tillable hectares on the lot with the livestock facilities				X		=	(Maximum 300 NU)
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor E							
S (Manure Storage Base Distance, m)							
Now What?	Repeat MDS calculation process as appropriate for other *livestock facilities* in the vicinity. Apply calculated MDS in the context of the land use planning application for which they were prepared.						

MDS II CALCULATION FORM

The following outlines the 10 Steps on how to calculate setbacks to all development reasonably expected to be impacted by a proposed *first* or *expanded livestock facility*. Each step is colour-coded. Applicable topics are found in the Implementation Guidelines Chart on pages 9 to 25 and applicable Tables are noted.

Step 1	Location and contact information	Fill in the pertinent information about the applicant who is proposing a *first*, or *expanded, livestock facility*. Implementation Guidelines #1 through #16 provide direction on the general rules and application of the Minimum Distance Separation Formulae.
Step 2	*Livestock facility* animal/material types	Fill in all existing, and proposed to be added, animal/material types, descriptions, the total maximum *housing capacity*, the number of animals/material per *Nutrient Unit* (NU) and associated manure forms. Table 1 and Implementation Guidelines #17 through #20 provide guidance on determining *livestock facility* capacity. Implementation Guidelines #21 and #22 provide direction on dealing with *anaerobic digesters*.
Step 3	Existing, and proposed to be added *Nutrient Units* (NU)	Calculate the existing, and proposed to be added, NU capacity of the *livestock facility* by dividing existing, and proposed to be added, capacity of each animal/material type by the number of animals/material per NU as found in Table 1. Then, add all the existing, and proposed to be added, NU together for all the types of animal/material present, to obtain the total number of NU.
Step 4	Weighted Factor A	Determine Factor A (Odour Potential Factor) from Table 1, for only each animal/material type proposed to be added, and fill in the calculation form. If necessary, calculate the weighted average for Factor A, if Factor A is not the same for all animals/materials added. See Implementation Guidelines #26 and #31 for further direction.

Step 5	Weighted Factor D	Determine Factor D (Manure Form in Permanent Storage Factor) from Table 1, for only each animal/material type added, and fill in the calculation form. If necessary, calculate the weighted average for Factor D, if Factor D is not the same for all animals/materials added. See Implementation Guidelines #29 and #32 for further direction.
Step 6	Factor B	Determine Factor B from Table 2, based on the Total NU to be housed at the *livestock facility*, and fill in the space on the calculation form. In some cases, it will be necessary to interpolate Factor B from Table 2, when the number of NU is not specifically identified in the table. Implementation Guideline #27 provides more specific direction on Factor B.
Step 7	Determining Percentage Increase for *livestock facility*	Determine if a building permit was issued on this *lot* in the past 3 years that increased the *livestock* capacity of the *livestock facility*. If 'No', use Approach (i) below to calculate Percentage Increase. If 'Yes', use Approach (ii) below to calculate Percentage Increase. Approach (i) Enter total Added NU as calculated in Step 3 above. Enter total Existing NU as calculated in Step 3 above. If total Existing NU is zero (i.e. this is the *First Livestock Facility* on the *lot*), then the Percentage Increase is considered to be at its maximum, or 700% as per Table 3. If total Existing NU is not zero, divide Added NU by Existing NU and multiply by 100. This value is the Percentage Increase. In rare cases of downsizing, the Added NU would actually be 'negative'. In this case, the Percentage Increase is 'negative', but considered to be at its minimum, or 0% as per Table 3. Approach (ii) Enter total Added NU as calculated in Step 3 above, as well as the total number of NU added in the past 3 years by previous building permit(s). Enter total Existing NU of the *livestock facility* as it was 3 years ago, prior to the current application date. If total Existing NU 3 years ago was zero, then the *livestock facility* in this current application and the one(s) constructed in the past 3 years are all considered to be the *First Livestock Facility* on the *lot*, and the Percentage Increase is considered to be at its maximum, or 700% as per Table 3. If total Existing NU 3 years ago was not zero, divide Added NU continued...

Step 7 continued...		continued... in this application plus Added NU over the past 3 years, by Existing NU 3 years ago and multiply by 100. This value is the Percentage Increase. In rare cases of downsizing, the Added NU would actually be 'negative'. In this case, the Percentage Increase is 'negative', but considered to be at its minimum, or 0% as per Table 3. Implementation Guideline #28 provides further direction and assistance on calculating Percentage Increase, and establishing Factor C.
Step 8	Factor C	Determine and fill in Factor C (Orderly Expansion Factor) on the calculation form, based on the Percentage Increase calculated in Step 7. Factor C can be determined from Table 3. In some instances, it may be necessary to interpolate Factor C. Implementation Guideline #28 provides direction on calculating the Percentage Increase in NU for the proposed construction.
Step 9	F, Building Base Distance	Calculate F (Building Base Distance) = (Factor A) x (Factor D) x (Factor B) x (Factor C), which is the required MDS II setback from all proposed *first* or *expanded livestock facilities* to the nearest development. For further information, see Implementation Guidelines #23 and #34.
Step 10	S, *Manure Storage* Base Distance	Establish S (*Manure Storage* Base Distance) by first using Table 5 to choose the proposed new storage at the *livestock facility* with the highest odour potential: Very Low, Low, Medium, and High. Then, enter Table 6 under the appropriate column and read across using 'F' calculated from Step 9. It may be necessary to interpolate from the table. 'S' is the required MDS II setback from all proposed new storages to the nearest development. Implementation Guidelines #24 and #25 provide further information. Implementation Guidelines #21 and #22 provide further information on dealing with *anaerobic digesters*.
Now What?	Using calculated MDS	The calculated values of MDS II can now be applied to the building permit application. Implementation Guidelines #35 through #39 provide direction around Type A and Type B land uses. For Type A land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 1.0 to determine the required MDS setback. For Type B land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 2.0 to determine the required MDS setback. Implementation Guideline #40 provides direction around setbacks from rear *lot* lines, side *lot* lines and road allowances. For rear and side *lot* lines, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.1 to determine the required continued...

Now What?

continued...

continued...
MDS setback. In accordance with Implementation Guideline #44, the required MDS setback from a rear or side *lot* line should never exceed 30 metres. For road allowances, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.2 to determine the required MDS setback. Implementation Guidelines #41 through #44 provide direction around issues of measurement of MDS II setbacks. Implementation Guidelines #45 and #46 provide direction on issues regarding minor variances.

Example:

Mr. Jones proposes to build a second 1200 head swine feeder barn with concrete liquid *manure storage* to go along with his existing:

- 1200 head swine feeder barn over a slatted floor where all the swine manure is stored;
- 33000 bird chicken broiler barn (9-week cycle) with solid *manure storage* outside, uncovered, dry enough for a flowpath option;
- 10 m x 12 m x 2 m permanent concrete storage with flowpath option, for his imported solid dairy manure; and
- The existing facilities were constructed more than 3 years ago.

How far must the proposed barn be sited from all development reasonably expected to be impacted?

Evaluator: _____

Date: _____

File Number: _____

Applicant Information:

First Name	Jim	**Lower Tier**	Lower Somewhere
Last Name	Jones	**Lot**	2
Farm/Company	Swiney-Acres Farm	**Concession**	2
Address	124 New Road	**Fire Number**	123456
City/Town	Somewhere	**Roll Number**	667
Province	Ontario	**Telephone**	905-555-3333
Postal Code	N0G 0J0	**Fax**	905-555-4444
Upper Tier	Upper Somewhere	**Email**	jjones@newroad.ca

MDS II CALCULATION FORM

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Exisiting NU	Proposed Maximum Housing Capacity	Added NU	Total NU	Factor A	Factor AD
Swine	Feeders (27 kg - 105 kg)	6	Liquid	1200	200	1200	200	400	1.2	0.8
Chickens	Broilers (9 week cycle)	300	Solid	33000	110	N/A	N/A	110	N/A	N/A
Imported Manure	Maximum Capacity (10m x 12m x 2m)	19.8	Solid	240	12	N/A	N/A	12	N/A	N/A
Totals					322		200	522		

Factor A (Odour Potential Factor) weighted average may be necessary	1.2
Factor D (Manure Form Factor) weighted average may be necessary	0.8
Factor B (*Nutrient Units* Factor)	563

Has a building permit been issued for the *livestock facility* on this property, in the last 3 years that has increased its *livestock* capacity? No? Yes? *If No, proceed to Approach (i); if Yes, proceed to Approach (ii)*

Approach (i) - No Building Permits in Last 3 Years		**Approach (ii)** - Building Permit(s) issued in Last 3 Years	
Calculation of Percentage Increase		Calculation of Percentage Increase	
Total 2 - Total Added NU (From Above)	200	Total 2 - Total Added NU (From Above) + Total Added NU from building permit(s) issued in the last 3 Years	
Total 1 - Total Existing NU (From Above)	322	Total 1 - Total Existing NU at *Livestock Facility* - 3 Years Ago	
If Total 1 = Zero - Treat as a *First Livestock Facility*		If Total 1 = Zero - Treat as a *First Livestock Facility*	
% Increase: (Total 2/Total 1) x 100	62.1%	% Increase: (Total 2/Total 1) x 100	

Factor C (Orderly Expansion Factor)	0.825
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor C	446
S (*Manure Storage* Base Distance, m)	446

Now What? Apply MDS calculation to building permit application as appropriate. For Type A land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 1.0 to determine the required MDS setback. For Type B land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 2.0 to determine the required MDS setback. Implementation Guideline #40 provides direction around setbacks from rear *lot* lines, side *lot* lines and road allowances. For rear and side *lot* lines, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.1 to determine the required MDS setback. In accordance with Implementation Guideline #44, the required MDS setback from a rear or side *lot* line should never exceed 30 metres. For road allowances, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.2 to determine the required MDS setback.

Now What?

continued...

continued...

MDS setback. In accordance with Implementation Guideline #44, the required MDS setback from a rear or side *lot* line should never exceed 30 metres. For road allowances, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.2 to determine the required MDS setback. Implementation Guidelines #41 through #44 provide direction around issues of measurement of MDS II setbacks. Implementation Guidelines #45 and #46 provide direction on issues regarding minor variances.

Example:

Mr. Jones proposes to build a second 1200 head swine feeder barn with concrete liquid *manure storage* to go along with his existing:

- 1200 head swine feeder barn over a slatted floor where all the swine manure is stored;
- 35000 bird chicken broiler barn (9-week cycle) with solid *manure storage* outside, uncovered, dry enough for a flowpath option;
- 40 m x 12 m x 2 m permanent concrete storage with flowpath option, for his imported solid dairy manure; and
- The existing facilities were constructed more than 3 years ago.

How far must the proposed barn be sited from all development reasonably expected to be impacted?

Evaluator: _____

Date: _____

File Number: _____

Applicant Information:

First Name	Jim	**Lower Tier**	Lower Somewhere
Last Name	Jones	**Lot**	2
Farm/Company	Swiney-Acres Farm	**Concession**	2
Address	124 New Road	**Fire Number**	123456
City/Town	Somewhere	**Roll Number**	667
Province	Ontario	**Telephone**	905-555-3333
Postal Code	N0G 0J0	**Fax**	905-555-4444
Upper Tier	Upper Somewhere	**Email**	jjones@newroad.ca

MDS II CALCULATION FORM

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Exisiting NU	Proposed Maximum Housing Capacity	Added NU	Total NU	Factor A	Factor AD
Swine	Feeders (27 kg - 105 kg)	6	Liquid	1200	200	1200	200	400	1.2	0.8
Chickens	Broilers (9 week cycle)	300	Solid	33000	110	N/A	N/A	110	N/A	N/A
Imported Manure	Maximum Capacity (10m x 12m x 2m)	19.8	Solid	240	12	N/A	N/A	12	N/A	N/A
Totals					322		200	522		

Factor A (Odour Potential Factor) weighted average may be necessary	1.2
Factor D (Manure Form Factor) weighted average may be necessary	0.8
Factor B (*Nutrient Units* Factor)	563

Has a building permit been issued for the *livestock facility* on this property, in the last 3 years that has increased its *livestock* capacity? No? Yes? *If No, proceed to Approach (i); if Yes, proceed to Approach (ii)*

Approach (i) - No Building Permits in Last 3 Years		**Approach (ii)** - Building Permit(s) issued in Last 3 Years	
Calculation of Percentage Increase		Calculation of Percentage Increase	
Total 2 - Total Added NU (From Above)	200	Total 2 - Total Added NU (From Above) + Total Added NU from building permit(s) issued in the last 3 Years	
Total 1 - Total Existing NU (From Above)	322	Total 1 - Total Existing NU at *Livestock Facility* - 3 Years Ago	
If Total 1 = Zero - Treat as a *First Livestock Facility*		If Total 1 = Zero - Treat as a *First Livestock Facility*	
% Increase: (Total 2/Total 1) x 100	62.1%	% Increase: (Total 2/Total 1) x 100	

Factor C (Orderly Expansion Factor)	0.825
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor C	446
S (*Manure Storage* Base Distance, m)	446

Now What? Apply MDS calculation to building permit application as appropriate. For Type A land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 1.0 to determine the required MDS setback. For Type B land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 2.0 to determine the required MDS setback. Implementation Guideline #40 provides direction around setbacks from rear *lot* lines, side *lot* lines and road allowances. For rear and side *lot* lines, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.1 to determine the required MDS setback. In accordance with Implementation Guideline #44, the required MDS setback from a rear or side *lot* line should never exceed 30 metres. For road allowances, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.2 to determine the required MDS setback.

MDS II CALCULATION BLANK FORM

Evaluator: _____

Date: _____

File Number: _____

Contact Information:

	Applicant Information	Owner of Adjacent *Livestock Facility* #1	Owner of Adjacent *Livestock Facility* #2, etc
File Name			
Last Name			
Farm/Company			
Address			
City/Town			
Province			
Postal Code			
Upper Tier			
Lower Tier			
Lot			
Concession			
911 Number			
Roll Number			
Telephone			
Fax			
Email			

MDS II CALCULATION BLANK FORM

Animal Type or Material	Description	Number per NU	Manure Form	Existing Maximum Housing Capacity	Exisiting NU	Proposed Maximum Housing Capacity	Added NU	Total NU	Factor A	Factor AD
Swine										
Chickens										
Imported Manure										
Totals										

Factor A (Odour Potential Factor) weighted average may be necessary	
Factor D (Manure Form Factor) weighted average may be necessary	
Factor B (*Nutrient Units* Factor)	

Has a building permit been issued for the *livestock facility* on this property, in the last 3 years that has increased its *livestock* capacity? No? Yes? *If No, proceed to Approach (i); if Yes, proceed to Approach (ii)*

Approach (i) - No Building Permits in Last 3 Years		**Approach (ii)** - Building Permit(s) issued in Last 3 Years	
Calculation of Percentage Increase		Calculation of Percentage Increase	
Total 2 - Total Added NU (From Above)		Total 2 - Total Added NU (From Above) + Total Added NU from building permit(s) issued in the last 3 Years	
Total 1 - Total Existing NU (From Above)		Total 1 - Total Existing NU at *Livestock Facility* - 3 Years Ago	
If Total 1 = Zero - Treat as a *First Livestock Facility*		If Total 1 = Zero - Treat as a *First Livestock Facility*	
% Increase: (Total 2/Total 1) x 100		% Increase: (Total 2/Total 1) x 100	

Factor C (Orderly Expansion Factor)	
F (Building Base Distance, m) = Factor A x Factor D x Factor B x Factor C	
S (*Manure Storage* Base Distance, m)	

Now What?	Apply MDS calculation to building permit application as appropriate. For Type A land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 1.0 to determine the required MDS setback. For Type B land uses, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 2.0 to determine the required MDS setback. Implementation Guideline #40 provides direction around setbacks from rear *lot* lines, side *lot* lines and road allowances. For rear and side *lot* lines, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.1 to determine the required MDS setback. In accordance with Implementation Guideline #44, the required MDS setback from a rear or side *lot* line should never exceed 30 metres. For road allowances, the values of Building Base Distance 'F' and Storage Base Distance 'S' should be multiplied by 0.2 to determine the required MDS setback.

FACTOR TABLES

Table 1: Factor A (Odour Potential) and Factor D (Manure or Material Form in Storage Facility)

Animal Type or Material	Description	Number per NU	Factor A	Manure or Material Form in Permanent Storage	
				Liquid Manure: Factor D = 0.8 < 18% Dry Matter	**Solid Manure: Factor D = 0.7 18 - 100% Dry Matter**
Swine	Sows with litter, dry sows/boars Segregated Early Weaning (SEW)	3.33		Most systems have liquid manure stored under the barn slats for short or long periods, or in storages located outside	Systems with solid manure inside on deep bedded packs, or with scraped alleys
	Sows with litter, dry sows or boars (non-SEW)	3.5	1.0		
	Breeder gilts (entire barn designed specifically for this purpose)	5			
	Weaners (7 kg – 27 kg)	20	1.1		
	Feeders (27 – 105 kg)	6	1.2		
Dairy Cattle[1]	**Milking-age cows (dry or milking)**			Free-stall barns with minimal bedding, or sand bedding, or tie-stall barns with minimal bedding & milking centre washwater added	Tie-stall barns with lots of bedding, or loose housing with deep bedded pack, and with or without outside yard access
	- Large-framed; 545 kg – 636 kg (e.g. Holsteins)	0.7			
	- Medium-framed; 455 kg – 545 kg (e.g. Guernseys)	0.85			
	- Small-framed; 364 kg – 455 kg (e.g. Jerseys)	1	0.7		
	Heifers (5 months to freshening)				
	- Large-framed; 182 kg – 545 kg (e.g. Holsteins)	2			
	- Medium-framed; 148 kg – 455 kg (e.g. Guernseys)	2.4			
	- Small-framed; 125 kg – 364 kg (Jerseys)	2.9			
	Calves (0 – 5 months)			Free-stall barns with minimal bedding, or sand bedding, or tie-stall barns with minimal bedding & milking centre washwater added	Bedded pens or stalls or heavily bedded calf hutches that are outside
	- Large-framed; 45 kg – 182 kg (e.g. Holsteins)	6			
	- Medium-framed; 39 kg – 148 kg (e.g. Guernseys)	7	0.7		
	- Small-framed; 30 kg – 125 kg (Jerseys)	8.5			
Beef Cattle	Cows, including calves to weaning (all breeds)	1	0.7	N/A	Bedded pack barns with or without outside yard access
	Feeders (7 – 16 months)	3		Slatted floor systems, or barns with minimal bedding & yard scraped to a liquid storage	
	Backgrounders (7 – 12.5 months)	3	0.8		
	Shortkeepers (12.5 – 17.5 months)	2			

Animal Type, or Material	Description	Number per NU	Factor A	Manure or Material Form in Permanent Storage	
				Liquid Manure: Factor D = 0.8 Less than 18% Dry Matter	Solid Manure: Factor D = 0.7 18 to 100% Dry Matter
Veal	Milk-fed	6	1.1	Slatted floors or slatted stall system	Heavily bedded pack barns
	Grain-fed	6	0.8		
Goats	Does & bucks (for meat kids; includes unweaned offspring & replacements)	8	0.7	N/A	Heavily bedded pack barns
	Does & bucks (for dairy; includes unweaned offspring & replacements)	8			
	Kids (dairy or feeder kids)	20			
Sheep	Ewes & rams (for meat lambs; includes unweaned offspring & replacements)	8	0.7	N/A	All sheep systems
	Ewes & rams (dairy operation; includes unweaned offspring & replacements)	6			
	Lambs (dairy or feeder lambs)	20			
Horses	Large-framed, mature; > 681 kg (including unweaned offspring)	0.7	0.7	N/A	All horse systems
	Medium-framed, mature; 227 kg – 680 kg (including unweaned offspring)	1			
	Small-framed, mature; < 227 kg (including unweaned offspring)	2			
Chickens	Layer hens (for eating eggs; after transfer from pullet barn)	150	1.0	Birds in cages, manure belts, no drying of manure, water added	Birds in cages, manure belts & drying, or floor systems
	Layer pullets (day olds until transferred into layer barn)	500	0.7		
	Broiler breeder growers (males/females transferred out to layer barn)	300	0.7	N/A	Bedded floors
	Broiler breeder layers (males/females transferred in from grower barn)	100	0.7	N/A	Cage or slatted floor systems
	Broilers on an 8 week cycle	350	0.7	N/A	Bedded floor systems
	Broilers on a 9 week cycle	300			
	Broilers on a 10 week cycle	250			
	Broilers on a 12 week cycle	200			
	Broilers on any other cycle, or if unknown, use 24.8 m^2/NU	24.8 m^2			
Turkeys	Turkey pullets (day old until transferred to layer turkey barn)	267	0.7	N/A	Bedded floor systems
	Turkey breeder layers (males/females transferred in from grower barn)	67			
	Breeder toms	45			
	Broilers (day olds to 6.2 kg)	133			
	Hens (day olds up to 6.2 kg to 10.8 kg; 7.5 kg is typical)	105			
	Toms (day olds to over 10.8 to 20 kg; 14.5 kg is typical)	75			
	Turkeys at any other weights, or if unknown, use 24.8 m^2/NU	24.8 m^2			

Animal Type, or Material	Description	Number per NU	Factor A	Manure or Material Form in Permanent Storage	
				Liquid Manure: Factor D = 0.8 Less than 18% Dry Matter	Solid Manure: Factor D = 0.7 18 to 100% Dry Matter
Quail	Use 24.8 m^2/NU	24.8 m^2	0.7	N/A	Bedded floor systems
Partridge	Use 24.8 m^2/NU	24.8 m^2			
Pheasants	Use 24.8 m^2/NU	24.8 m^2			
Squab	Use 24.8 m^2/NU	24.8 m^2			
Rheas	Adults (includes replacements & market birds)	13			
Emus	Adults (includes replacements & market birds)	12			
Ostriches	Adults (includes replacements & market birds)	4			
Ducks	Peking	105	0.8	Wire mesh flooring systems	Bedded floor systems
	Muscovy, use 24.8 m^2/NU	24.8 m^2			
Geese	Use 24.8 m^2/NU	24.8 m^2			
Rabbits	Breeding females (including males, replacements & market animals)	40	0.8	N/A	Cage or floor systems
Chinchillas	Breeding females (including males, replacements & market animals)	320			
Fox	Breeding females (including males, replacements & market animals)	25	1.0		
Mink	Breeding females (including males, replacements & market animals)	90			
Bison	Adults (includes unweaned calves & replacements)	1.3	0.7	N/A	Bedded pack barns with outside access or outside confinement areas
	Feeders (170 kg – 477 kg)	4			
Llama	Adults (includes unweaned young & replacements)	5			
	Feeders (45 kg – 86 kg)	16			
Alpaca	Adults (includes unweaned young & replacements)	8			
	Feeders (23 kg – 48 kg)	26			
Wild Boar	Breeding age sows (includes boars, replacements & weaned piglets to 27 kg)	5			
	Finishing boars (27 kg – 86 kg)	7			

Continued...

Animal Type, or Material	Description	Number per NU	Factor A	Manure or Material Form in Permanent Storage	
				Liquid Manure: Factor D = 0.8 Less than 18% Dry Matter	Solid Manure: Factor D = 0.7 18 to 100% Dry Matter
Deer	**White tailed deer** - Adults > 24 mo (including unweaned offspring) - Feeders **Red deer** - Adults > 24 mo (including unweaned offspring) - Feeders **Elk** - Adults > 24 mo (including unweaned offspring) - Feeders **Elk/deer hybrids** - Adults > 24 mo (including unweaned offspring) - Feeders **Fallow deer** - Adults > 24 mo (including unweaned offspring) - Feeders	11 21 7 14 2 6 4 10 13 23	0.7	N/A	Bedded pack barns with outside access OR outside confinement areas
Other *livestock* not listed in this table	To determine the number per NU, add up the total maximum live weight of animals and divide by the weight of animals per NU in the next column	453.6 kg (1000 lbs)	0.8	All storages with liquid manure	All storages with solid manure
Manure imported to a *lot* not generating *manure*[2]	Maximum capacity of permanent storages at any time: solid or liquid capacity	19.8 m^3 (700 ft^3)	1.2	All storages with liquid manure	All storages with solid manure
Storages for *digestate* from an *Anaerobic Digester* (odours reduced during this process)	Maximum capacity of permanent storages at any time: solid or liquid capacity	19.8 m^3 (700 ft^3)	0.5	All storages with liquid manure	All storages with solid manure

1. On farms with 100 milking-age cows (dry & milking), there are usually about 20 replacement calves and 80 replacement heifers.
2. Average value for typical types of manures that might be imported to a *lot*, such as poultry, dairy, beef, swine, horse or other manure.
N/A = Not Applicable

Table 2: Factor B (Nutrient Units Factor)

In using Table 2 to determine Factor B, it may be necessary to interpolate a value for Factor B. For example, you determine the total number of *nutrient units* at a *livestock facility* to be 255 NU. Table 2 provides a value for Factor B for 250 NU and for 260 NU, but not for 255 NU. The value of Factor B for 250 NU is 435 and the value of Factor B for 260 NU is 441. To determine Factor B for 255 NU interpolate between the numbers 435 and 441. In this example, the value of Factor B for 255 NU is 438.

When interpolating a value for Factor B do not include more than two decimal places. Interpolated values with more than two decimal places should be rounded accordingly. For example, if an interpolated value for Factor B is calculated as 499.238, then use a value of 499.24 for Factor B in the MDS calculation.

For operations less than 5 NU in size, do not interpolate, but use a Factor B of 150. For operations greater than 5000 NU in size, contact OMAFRA staff to determine Factor B.

Final NU	Factor B
Up to 5	150
6	153
7	157
8	160
9	163
10	167
11	170
12	173
13	177
14	180
15	183
16	187
17	190
18	193
19	197
20	200
21	202
22	204
23	206
24	208
25	210
26	212
27	214
28	216
29	218
30	220
31	222
32	224
33	226
34	228
35	230
36	232
37	234
38	236
39	238
40	240
41	242
42	244
43	246
44	248
45	250

Final NU	Factor B
46	252
47	254
48	256
49	258
50	260
52	264
54	268
56	272
58	276
60	280
62	282
64	284
66	285
68	287
70	289
72	291
74	293
76	294
78	296
80	298
82	300
84	301
86	303
88	305
90	307
92	309
94	310
96	312
98	314
100	316
102	318
104	320
106	322
108	324
110	326
112	329
114	331
116	333
118	335
120	337
122	339

Final NU	Factor B
124	340
126	342
128	344
130	346
135	351
140	355
145	360
150	364
155	368
160	372
165	376
170	380
175	384
180	388
185	392
190	395
195	399
200	402
205	406
210	409
215	413
220	416
225	419
230	423
235	426
240	429
245	432
250	435
260	441
270	447
280	453
290	458
300	464
310	469
320	474
330	480
340	485
350	490
360	494
370	499
380	504

Final NU	Factor B
390	508
400	513
410	517
420	522
430	526
440	530
450	535
460	539
470	543
480	547
490	551
500	555
520	562
540	570
560	577
580	584
600	591
620	598
640	605
660	611
680	618
700	624
750	639
800	654
850	668
900	681
950	694
1000	707
1100	731
1200	753
1300	775
1400	795
1500	815
2000	870
3000	980
4000	1090
5000	1200
Greater than 5000	Contact OMAFRA staff

Table 3: Factor C (Orderly Expansion Factor)

In using Table 3 to determine Factor C, it may be necessary to interpolate a value for Factor C. For example, you determine the percentage increase at a *livestock facility* to be 155%. Table 3 provides a value for Factor C for a 150% increase, and for a 160% increase, but not for a 155% increase. The value of Factor C for a 150% increase is 0.9371 and the value of Factor C for a 160% increase is 0.9497. To determine Factor C for a 155% increase interpolate between the numbers 0.9371 and 0.9497. In this example, the value of Factor C for a 155% increase is 0.9434.

When interpolating a value for Factor C do not include more than four decimal places. Interpolated values with more than four decimal places should be rounded accordingly. For example, if an interpolated value for Factor C is calculated as 0.977643, then use a value of 0.9776 for Factor C in the MDS calculation.

For operations with a 0% increase, or a decrease, i.e. 'negative' percentage increase, use a value of 0.5000 for Factor C. Do not interpolate below a value of 0.5000. For operations with a 700% increase or greater, or for a *first livestock facility*, use a value of 1.1400 for Factor C. Do not interpolate above a value of 1.1400.

% Increase in Nutrient Units	Factor C
0% increase or decreases ('negative' increase)	0.5000
1%	0.5062
2%	0.5124
3%	0.5186
4%	0.5248
5%	0.5310
6%	0.5372
7%	0.5434
8%	0.5496
9%	0.5558
10%	0.5620
11%	0.5682
12%	0.5744
13%	0.5806
14%	0.5868
15%	0.5930
16%	0.5992
17%	0.6054
18%	0.6116
19%	0.6178
20%	0.6240
21%	0.6302
22%	0.6364
23%	0.6426
24%	0.6488
25%	0.6550
26%	0.6612

% Increase in Nutrient Units	Factor C
27%	0.6674
28%	0.6736
29%	0.6798
30%	0.6860
31%	0.6922
32%	0.6984
33%	0.7046
34%	0.7108
35%	0.7170
36%	0.7232
37%	0.7294
38%	0.7356
39%	0.7418
40%	0.7480
41%	0.7542
42%	0.7604
43%	0.7666
44%	0.7728
45%	0.7790
46%	0.7852
47%	0.7914
48%	0.7976
49%	0.8038
50%	0.8100
55%	0.8167
60%	0.8230
65%	0.8294
70%	0.8357
75%	0.8420

% Increase in Nutrient Units	Factor C
80%	0.8484
85%	0.8547
90%	0.8610
95%	0.8674
100%	0.8737
105%	0.8800
110%	0.8864
115%	0.8927
120%	0.8990
125%	0.9054
130%	0.9117
135%	0.9180
140%	0.9244
145%	0.9307
150%	0.9371
160%	0.9497
170%	0.9624
180%	0.9751
190%	0.9877
200%	1.0000
300%	1.0280
400%	1.0560
500%	1.0840
600%	1.1120
700% increase, or more, or *First Livestock Facility* on *lot* of record.	1.1400

Table 4: Factor E (Encroaching Land Use Factor)

Encroaching Land Use	Factor E
Type A Land Use	1.1
Type B Land Use	2.2

Encroachment of urban development

Table 5: Permanent *Manure or Material Storage* Types

Solid *Manure*: 18% dry matter, or more
Liquid *Manure*: Less than 18% dry matter
***Digestate*: Less than 18% dry matter**

Storage Odour Potential	Solid or Liquid System	Inside or Outside Livestock Facility	Number referred to in Table 6 (View images in Appendix A)	Description of permanent manure storages being sited by MDS II, or encroached upon through MDS I application
Very Low	Solid	Inside	V1	Solid, inside, bedded pack (manure accumulates under *livestock* over time)
		Outside	V2	Solid, outside, covered (cover keeps off precipitation to prevent runoff)
			V3	Solid, outside, no cover, greater than or equal 30% dry matter (manure is dry enough that a flowpath option can be used for runoff control (*Nutrient Management Act, 2002*)
			V4	Solid, outside, no cover, 18% to less than 30% dry matter, with covered liquid runoff storage (manure not dry enough to soak up precipitation, so a liquid runoff storage needed, but it has a permanent, tight cover
	Liquid	Inside	V5	Liquid, inside, underneath slatted floor (manure is stored under the animals in the barn)
		Outside	V6	Liquid, outside, with a permanent, tight fitting cover (negative pressure tarp, concrete lid, inflatable dome, etc.)
			V7	Liquid, (digestate), outside, no cover (all manure has been treated through anaerobic digestion, or a similar process that reduces odours)
Low	Solid	Outside	L1	Solid, outside, no cover, 18% to less than 30% dry matter, with uncovered liquid runoff storage (manure not dry enough to soak up precipitation, so a liquid runoff storage needed, but it is uncovered, producing more odour than in V4 above)
	Liquid	Outside	L2	Liquid, outside, with a permanent floating cover (tarps, foam panels, etc.)
Medium	Liquid	Outside	M1	Liquid, outside, no cover, straight-walled storage (usually circular or rectangular concrete, or steel storages)
			M2	Liquid, outside, roof, but with open sides (roof keeps off precipitation, but the open sides allow wind to travel over the manure and carry odours)
High	Liquid	Outside	H1	Liquid, outside, no cover, sloped-sided storage (earthen *manure storages*, but not earthen runoff storages associated with a solid *manure storage* which are L1 above)

Table 6: MDS I/II Separation Distances for Permanent Manure or Material Storage Types in Table 5

In using Table 6 (see page 51) to determine a value for 'S' – Storage Separation Distance, in some instances it may be necessary to interpolate a value.

For example, you determine the value for Encroachment Base Distance 'F' to be 106 metres. From Table 5, you have determined that the *livestock facility* uses a storage facility with an odour potential that is considered medium (M1).

Table 6 provides a value for Storage Separation Distance 'S' for an M1 Storage for an Encroachment Base Distance 'F' of 100 metres and for an Encroachment Base Distance 'F' of 110 metres, but not for an Encroachment Base Distance 'F' of 106 metres. The value of Storage Separation Distance 'S' for an M1 Storage with an Encroachment Base Distance 'F' of 100 metres, is 190 metres. The value of Storage Separation Distance 'S' for an M1 Storage with an Encroachment Base Distance 'F' of 110 metres, is 199 metres. To determine the value of Storage Separation Distance 'S' for an M1 Storage, with an Encroachment Base Distance 'F' of 106 metres interpolate between the numbers 190 and 199. In this example, the value of Storage Separation Distance 'S' for an M1 Storage, with an Encroachment Base Distance 'F' of 106 metres is 195.4 metres. This value should be rounded to the nearest whole number, in this case 195 metres.

When interpolating a value for Storage Separation Distance 'S' do not include any decimal places. Interpolated values with decimal places should be rounded accordingly. For example, if an interpolated value for Storage Separation Distance 'S' is calculated as 202.83 metres, then use a value of 203 metres for Storage Separation Distance 'S'.

In all instances, where Encroachment or Building Base Distance 'F' exceeds 1000 metres, then Storage Separation Distance 'S' will be the same value as 'F'.

Table 6: MDS I/II Separation Distances for Permanent Manure

Building Base Distance (m) for MDS II ('F'), or Encroachment Base Distance for MDS I ('F')	Storage Separation Distances Based on Relative Odour Potential - Storage Base Distance, 'S' (m)			
	Very Low Odour Storages V1 to V7	Low Odour Storages L1 to L2	Medium Odour Storages M1 to M2	High Odour Storages H1
40	40	64	136	232
50	50	74	145	240
60	60	84	154	248
70	70	93	163	256
80	80	103	172	264
90	90	113	181	272
100	100	123	190	280
110	110	132	199	288
120	120	142	208	296
130	130	152	217	304
140	140	162	226	312
150	150	171	235	320
160	160	181	244	328
170	170	191	253	336
180	180	201	262	344
190	190	210	271	352
200	200	220	280	360
210	210	230	289	368
220	220	240	298	376
230	230	249	307	384
240	240	259	316	392
250	250	269	325	400
260	260	279	334	408
270	270	288	343	416
280	280	298	352	424
290	290	308	361	432
300	300	318	370	440
310	310	327	379	448
320	320	337	388	456
330	330	347	397	464
340	340	357	406	472
350	350	366	415	480
360	360	376	424	488
370	370	386	433	496
380	380	396	442	504
390	390	405	451	512
400	400	415	460	520
420	420	435	478	536
440	440	454	496	552
460	460	474	514	568
480	480	493	532	584
500	500	513	550	600
600	600	610	640	680
800	800	805	820	840
1000	1000	1000	1000	1000
Greater than 1000 m	Storage Base Distance, 'S', should be the same as Building Base Distance or Encroachment Base Distance – 'F'			

APPENDIX: MANURE OR MATERIAL STORAGE TYPES

Type	Description	Image
V1	Solid, inside, bedded pack (manure accumulates under *livestock* over time)	
V2	Solid, outside, covered (cover keeps off precipitation to prevent runoff)	
V3	Solid, outside, no cover, greater than or equal 30% dry matter (manure is dry enough that a flowpath option can be used for runoff control *(Nutrient Management Act, 2002)*	
V4	Solid, outside, no cover, 18% to less than 30% dry matter, with covered liquid runoff storage (manure not dry enough to soak up precipitation, so a liquid runoff storage needed, but it has a permanent, tight cover)	
V5	Liquid, inside, underneath slatted floor (manure is stored under the animals in the barn)	
V6	Liquid, outside, with a permanent, tight fitting cover (negative pressure tarp, concrete lid, inflatable dome, etc.)	
V7	Liquid, (*digestate*), outside, no cover (all manure has been treated through anaerobic digestion, or a similar process that reduces odours)	

Type	Description	Image
L1	Solid, outside, no cover, 18% to less than 30% dry matter, with uncovered liquid runoff storage (manure not dry enough to soak up precipitation, so a liquid runoff storage needed, but it is uncovered, producing more odour than in V4 above)	
L2	Liquid, outside, with a permanent floating cover (tarps, foam panels, etc.)	
M1	Liquid, outside, no cover, straight-walled storage (usually circular or rectangular concrete, or steel storages)	
M2	Liquid, outside, roof, but with open sides (roof keeps off precipitation, but the open sides allow wind to travel over the manure and carry odours)	
H1	Liquid, outside, no cover, sloped-sided storage (earthen *manure storages*, but not earthen runoff storages associated with a solid *manure storage* which are L1 above)	

ADDITIONAL INFORMATION

For further information and additional reading on related topics, please consult the following documents. Additional training materials on MDS may be available on OMAFRA's website **www.omafra.gov.on.ca**.

Legislation

The Planning Act, 1990
The Farming and Food Production Protection Act, 1998

Publications – Ontario Ministry of Municipal Affairs and Housing

Provincial Policy Statement, 2005

Publications – Ontario Ministry of Agriculture, Food and Rural Affairs

Guide to Agricultural Land Use, Publication 824

Factsheets
The Farming and Food Production Protection Act (FFPPA) and Nuisance Complaints, Order No. 05-013
Farmer and Neighbour Relations, Preventing and Resolving Local Conflicts, Order No. 05-001
What Rural Neighbours Can Expect From Large Livestock Operations, Order No. 06-027
Anaerobic Digestion Basics, Order No. 04-097

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